

**Massachusetts Health Insurance Survey
Methodology Report**

Survey Years: 2008 to 2011

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**Tim Triplett
Urban Institute**

**Sharon K. Long
University of Minnesota**

**David Dutwin and Susan Sherr
SSRS/Social Science Research Solutions**

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The Massachusetts Division of Health Care Finance and Policy (DHCFP) contracted with the Urban Institute, and its subcontractor, SSRS/Social Science Research Solutions (formerly International Communications Research/ICR), to conduct the Massachusetts Health Insurance Survey (MHIS). The goal of the MHIS is to document health insurance coverage and access to and use of health care for the non-institutionalized population in Massachusetts. This report provides information about the methods used to collect and analyze the 2008, 2009, 2010, and 2011 MHIS data. All four years of the MHIS survey follow the same basic format.

The report is organized in seven sections. The first section (Section I) describes the design of the sample used for the survey. Section II discusses the design of the survey instrument. Section III describes the data collection strategy. Since the MHIS began, there have been a few minor changes made to the data collection procedures that were intended to improve the response rate to the survey. These changes are described in Section III. Data processing and preparation are described in Section IV. Section V addresses the response rate to the survey. Section VI describes the survey weights and variance estimation. Section VII estimates the share of non-landline telephone households while Section VIII presents estimates of the uninsurance rate in Massachusetts for each year. The final section provides a comparison of the dual sample frames used in the study (described below). The MHIS survey instruments are available at the DHCFP Website.

I. Sample Design

Beginning in 2008, the MHIS survey moved to a dual sample frame design that combines a random-digit-dial (RDD) telephone sample and an address-based (AB) household sample.¹ The decision to rely on the dual-frame sample for the MHIS reflects the changing telephone environment in the United States. Historically, RDD telephone interviewing has been the method of choice for many survey data collection efforts given the strength of its randomization method (random digit dialing), ease of administering complex questionnaires using computerized interviewing systems, excellent coverage of the overall population (given that less than 2% of Americans live in a household without telephone service), and relatively low cost. Survey coverage refers to the extent to which the sample frame for a survey includes all members of the target population. A survey design with a gap in coverage raises the possibility of bias if the individuals missing from the sample frame (e.g., households without landline telephones) differ from those in the sample frame. Unfortunately, the coverage of the overall population in RDD surveys is changing as more and more households are relying on cell phones and giving up their landline telephones. Cell phone numbers are typically not called in RDD surveys.

Cell phone-only households are increasing rapidly in the United States, with 30% of households estimated to be cell phone-only in the second half of 2010, as compared to 25% in 2009 (Blumberg and Luke 2011). While there are limited data available on the share of cell phone-only households within each state, a model-based approach (combining survey data and synthetic estimates) was used to generate state-level estimates of cell phone-only households

¹ For the most part, earlier versions of the MHIS relied on RDD samples. However, in 1998, the MHIS also included a small, in-person survey based on an area probability sample because of concerns that an RDD sample might produce biased estimates of the uninsurance rate in Massachusetts. In the 1998 survey the estimates of the uninsurance rate from the RDD sample and area probability sample were quite similar, at 7.8% and 8.2%, respectively (Roman 2007).

using the National Health Interview Survey (NHIS). Based on that work, an estimated 16.8% of households in Massachusetts were cell phone-only in the first half of 2010 (Blumberg et al. 2011).

In order to capture cell phone-only households in the sample frame for the MHIS, the decision was made to include an address-based-sample (AB sample), along with the RDD sample, for the survey.² The AB sample captures households with landline phones, cell phone-only households and non-telephone households, supplementing the landline sample of the traditional RDD survey. One limitation of both the AB sample and the RDD sample is that they will miss homeless persons in the state. This is estimated to be less than 1% of the population.

Drawing the Samples. The MHIS includes both a random sample drawn from the AB sample frame and a random sample drawn from the RDD sample frame. The AB sample was developed in the following steps:

1. A file was generated of all Massachusetts residential addresses currently in use based on the United States Postal Service (USPS) Delivery Sequence File (DSF). The DSF is a computerized file that contains information on all delivery addresses serviced by the USPS, with the exception of general delivery.³ The DSF is updated weekly and

² One alternative strategy to incorporate cell phone-only households in the MHIS would be to conduct in-person surveys, which, unfortunately, are quite expensive. Another alternative would be to include cell phones as well as landline telephones as part of an RDD sample. While less expensive than in-person interviews, calling cell phones in an RDD survey is more expensive than a landline-only RDD survey since federal regulations require that cell phone calling be done by hand. In addition, there is a much lower success rate for completing an interview with a person on a cell phone than a landline phone. Further, many cell phone users also have landlines, increasing the number of calls to cell-phones that are needed to identify cell phone-only households, and many cell-phones are used by those under 18 years of age, who are not eligible for the survey. Finally, people who live in Massachusetts but have a cell phone that was purchased in another state will not be dialed in an RDD survey focused on Massachusetts residents since their cell phone number will not have a Massachusetts exchange and, conversely, not all cell phone numbers with a Massachusetts exchange are used by residents of Massachusetts. Concern about the potential size and composition of these two groups of cell phone users led to the decision to rely on the AB sample to capture cell phone-only households.

³ See <http://pe.usps.gov/text/dmm300/509.htm>.

contains home and apartment addresses as well as Post Office boxes and other types of residential addresses for mail delivery.

2. That address file was run against databases from InfoUSA, Experian, TargusInfo, and Acxiom that include all listed landline telephone numbers in the state to identify addresses with a listed telephone number.

In order to facilitate the fielding of the survey (discussed below), the final AB sample was divided into two strata: addresses with a listed landline telephone number and addresses without a listed landline telephone number.

Similar to the strategy with the AB sample, the RDD sample was split into two strata: those with a listed landline telephone number (and, therefore, a known address) and those without a listed landline telephone number (and, therefore, with no known address). The steps for drawing the RDD sample were as follows:

1. A file was generated of all residential telephone numbers currently in use in Massachusetts using Marketing Systems Group's GENESYS sampling system. The standard GENESYS RDD methodology produces a strict single stage, equal probability sample of residential telephone numbers to insure an equal and known probability of selection for every residential telephone number in the sample frame.⁴
2. The RDD file was run against reverse directory services ("white pages") of all listed landline telephone numbers in the state from InfoUSA, Experian, TargusInfo and Acxiom to identify telephone numbers in the RDD sample that were associated with a known address.

Since the survey is relying on two sample frames, households that could be included in both the RDD and AB sample frames have a greater probability of being selected for the survey

⁴ Consistent with industry standard procedure, we use list-assisted sampling to improve the efficiency of the RDD sample. In list-assisted sampling, the telephone numbers in the sample frame are divided into groups or "banks" of 1000 telephone numbers with the same first seven digits (e.g., (123-456-7XXX). These "banks" of telephone numbers are run through databases with listed household telephone numbers to identify telephone numbers that can be linked to a household with a listed telephone number. When none of the 1000 phone numbers in a bank are found to be listed, that 1000-bank is discarded from the survey sample. Any bank with at least one listed number is included in the sample frame.

than households who could only be captured in one of the sample frames, all else equal. That is, households with a landline telephone, who are included in both the RDD and AB sample frames, have a higher probability of being selected for the survey than households without a landline telephone (including cell phone-only households and non-telephone households), since they are only included in the AB sample frame. To address this issue, we oversampled households without a listed landline telephone number in the AB sample frame (as it is this stratum that includes the cell phone-only households and non-telephone households). We also undersampled the households without a listed landline number in the RDD sample to counterbalance their oversample in the AB sample. (The goal was to keep the proportion of households without a listed landline telephone number in the combined sample roughly comparable to their share of the overall population.)

The sample records in the four strata—RDD sample with a listed telephone number, RDD sample without a listed telephone number, AB sample with a listed telephone number, and AB sample without a listed telephone number--were randomized and put into small random subsamples or “replicates” to be released as needed for the study. The size and distribution of the initial sample release was based on our best estimate of the distribution of Massachusetts households by telephone ownership and our expected response rates across the different survey strata and survey modes. Each year we reevaluate these estimates and expectations based on our prior MHIS experience. For example, in 2011, we estimated that 51% of Massachusetts households had a listed landline telephone, 28% had an unlisted landline telephone, 19% had a cell phone (or cell phones) and no landline telephone, and 2% had no telephone service at all. We anticipated a response rate of 45% for sample households with a known landline telephone and a 30% response rate for those without a known landline telephone, for an overall projected

response rate of 34%.⁵ While this is a lower response rate than in a traditional RDD survey, the design used here captures information for residents of the state who will be missed in a traditional RDD survey (and, thus, effectively have a response rate of zero). In order to obtain a sample that was generally consistent with the distribution of telephone ownership, we allocated approximately 75% of the sample to the AB sample and 25% to the RDD sample.

The goal of the survey was to obtain interviews with an overall sample of 4,000 households in the state. Based on the survey results, we have been able to accomplish the goal of completing interviews in at least 4,000 households using less total sample in each successive round of the MHIS through 2010. In 2011, we used exactly the same amount of sample as the previous year. Table 1 shows the distribution of the final sample in each year by strata.

⁵ This is calculated as (45% response rate * 25% of the sample who could be contacted by landline telephone) + (30% response rate * 75% of the sample that could not be contacted by landline telephone).

Table 1: Distribution of the Final Sample Released for the MHIS, by Sample Frame					
Survey Year	Available Contact Information	RDD sample		AB sample	
		Total Sample Generated	Sample Released	Total Sample Generated	Sample Released
2008	With listed landline telephone number	5,434	5,434	9,709	6,593
	With no listed landline telephone	6,916	4,565	7,386	7,386
	Total Sample	12,350	9,999	17,095	13,979
2009	With listed landline telephone number	4,877	3,722	31,603	5,213
	With no listed landline telephone	6,173	3,163	6,397	5,952
	Total Sample	11,050	6,885	38,000	11,165
2010	With listed landline telephone number	3,038	2,865	28,512	4,857
	With no listed landline telephone	1,653	1,535	6,488	5,548
	Total Sample	4,691	4,400	35,000	10,405
2011	With listed landline telephone number	3,089	2,865	25,438	4,857
	With no listed landline telephone	1,723	1,535	6,562	5,548
	Total Sample	4,812	4,400	32,000	10,405

II. Instrument Development

The survey instrument used for the MHIS relies on the Coordinated State Coverage Survey (CSCS), developed by the State Health Access Data Assistance Center (SHADAC) at the University of Minnesota.⁶ Modifications to that design were made to address issues specific to Massachusetts as well as to simplify the structure of the survey for the mail instrument (described below). A number of the survey questions on access to and use of care in the MHIS

⁶ For a description of the CSCS, see <http://www.shadac.org/content/coordinated-state-coverage-survey-cscs>. We thank Kathleen Call at SHADAC for sharing the CSCS and helping to modify it for the MHIS.

were drawn from the Massachusetts Health Reform Survey (MHRS), a survey of working-age adults in Massachusetts conducted by the Urban Institute and SSRS.⁷ That survey is currently funded by the Blue Cross Blue Shield of Massachusetts Foundation. Earlier years of MHRS were also funded by the Commonwealth Fund and the Robert Wood Johnson Foundation. The MHIS survey instrument is pretested before each round of data collection as there have been some changes made to the questionnaire between rounds.

The MHIS begins by establishing that the household is included in the survey sample frame (which includes confirming that the home was a primary residence). The survey then asks for a person aged 18 or older who can answer questions about the health insurance coverage of the members of the household. That respondent is then asked questions that are used to create a roster of every individual in the household by age, gender, education, work status, and relationship to the respondent. Persons temporarily living away from home (including college students) are included in their usual household. Persons living in group quarters (e.g., dorms, nursing homes, and shelters) are excluded from the study, as are individuals sampled at their vacation homes or second homes. From this roster, one household member is randomly selected to be the “target” person for the household. Basic information (including demographic and socioeconomic characteristics and insurance status) are collected on all of the members of each selected household, with more detailed information collected for the target person. Table 2 summarizes the topic areas covered in the MHIS for all members of the household and for the household member selected as the target individual for the survey. As noted above, the survey includes a complete roster of all members of the household.

⁷ For a description of the MHRS, see http://www.urban.org/health_policy/url.cfm?ID=411649.

One concern in developing the survey instrument was that, because of the penalties associated with failing to comply with the individual mandate, individuals who were uninsured might refuse to participate in the survey or refuse to answer questions on their health insurance coverage. The advance letters and the introduction to the survey highlight the importance of the study, without reference to the individual's own health insurance coverage, and assure the respondent that everything that they say will be kept confidential. For example, the survey introduction includes: "As you may know, Massachusetts is one of several states taking the lead in finding ways to make health care more affordable and easier to obtain. The state would like to better understand how to improve access to affordable health insurance." With few exceptions, individuals who remained on the phone long enough to hear the introduction to the survey participated in the survey and, among those who participated in the survey, very few refused to answer the questions on insurance coverage.

Completion of the survey instrument in 2011 took approximately 21 minutes on average. Both the 2008 and 2009 instruments averaged about 19 minutes, and the 2010 instrument averaged 22 minutes. This increase in length was in-part due to more people in 2010 filling out the survey online or by mail; hence the phone interviews are becoming increasingly filled out by older respondents who tend to have longer interviews. Length of interview is based only on the phone interview.

Table 2: Summary of Topic Areas Covered in the MHIS, by Household Members				
Topics	Survey Respondent	All Household Members	Target Household Member	Target's Spouse (if present) and Parents (if present and Target age<26)
Demographic characteristics (age, race/ethnicity, gender, marital status)	X	X	X	X
Socioeconomic characteristics (education, employment status)	X	X	X	X
Nativity and citizenship status			X	
Length of residency in Massachusetts			X	
Health insurance coverage	X	X	X	X
Health care through Free Care	X	X	X	X
Detailed employment questions			X	X
Availability of employer sponsored insurance			X	X
Awareness of public insurance options			X (Target's parents if Target age <18)	
Awareness of health reform	X			
Impact of individual mandate			X	
Health status			X	
Access to and use of health care			X	
Family income			X	
Homeownership	X			
Household telephone status	X			

III. Data Collection Strategy

Because of delays associated with the redesign of the MHIS in 2008, the 2008 MHIS was fielded during the summer. The 2009 and 2010 years of the MHIS were conducted in the spring, while the 2011 study was once again fielded during the summer months. Data collection relies on three interview modes: telephone, web, and mail. Information for the RDD sample is obtained using traditional telephone interviewing methods, with mail and web-based options offered to the sample members for whom addresses could be obtained (i.e., the strata “RDD sample with listed telephone number”). The survey options are explained to those sample members in advance letters and reminder letters. Advance letters and reminder letters are mailed to all members in the AB sample offering the options of telephone, web, and mail survey models. In addition, for the AB sample for which listed telephone numbers could be obtained (i.e., the strata “AB sample with listed telephone number”), traditional telephone interviewing methods are used as well.

The specific steps for the data collection process were as follows.

1. Advance letters were sent to all households for whom we had an address, which included all households in the AB sample as well as telephone numbers in the RDD sample that had listed addresses. The advance letter invited the household to participate in the study and offered the option of calling in to the survey center using a 1-800 telephone number, completing a web-based survey, or completing a mail survey. The letters to the RDD sample and the AB sample with a listed telephone number also notified people that they would be receiving a call in the next few weeks to complete the survey.
2. Telephone interviews were attempted with all households for which we had a telephone number, including the entire RDD sample and the households in the AB sample with a listed telephone number. The initial call occurred within a few days of the mailing of the advance letters.
3. Reminder notices were sent to all non-responding households in the AB sample and the members of the RDD sample that have a listed address. These were sent out four weeks after the advance letters were mailed.

4. A final reminder notice was sent to all non-responding households in the AB sample and the RDD sample that had a listed address. In 2009, a copy of the mail questionnaire was included in the final reminder notice sent to a random subsample of non-responding households to test the impact of a final mailing of the instrument on the survey response rate. Because of the success of that experiment, a copy of the mail instrument was sent to all non-responding households in the 2010 and 2011 MHIS. The final reminder is sent out four weeks after the first reminder notice is mailed.

The advance letters and reminder letters were printed on Commonwealth of Massachusetts letterhead and signed by officials from the Massachusetts Executive Office of Health and Human Services (EOHHS). All of the letters included a 1-800 toll-free number that the respondent could call for additional information on the survey or to complete the survey by telephone.

Given the differences in our ability to contact the sample households for the survey, we obtained higher response rates for the RDD and AB samples with listed telephone numbers. We got lower response rates for the AB sample with no listed telephone number given that we were only able to contact those households via the mail. The overall response rate and the response rates achieved for the different components of the survey are described in Section V.

Survey Mode. As noted above, data were collected using multiple modes—telephone, web, and mail. Table 3 shows the number of completions for each mode of data collection with a separate category for in-bound (toll free) telephone calls from sample members requesting to complete the survey by telephone versus outbound phone interviews where a telephone interviewer called the respondent. For the most part, questions were identical for telephone, web, and mail instruments, although there were some changes to simplify the process of obtaining the household roster and the process used to select the random target person within the household in the mail survey. The major distinction between the telephone mode and the web

Table 3: Total Number of Completed Interviews for the RDD and AB Samples, by Survey Mode

	RDD sample			AB sample			Total Sample
	Total	With Known Address	With No Known Address	Total	With Listed Landline Telephone Number	With No Listed Landline Telephone Number	
2008 Total Interviews	1,619	1,479	140	3,291	2,102	1,189	4,910
Phone-outbound	980	840	140	1,211	1,211	0	2,191
Phone-inbound	76	76	0	338	96	242	414
Web/Internet	554	554	0	1,719	779	940	2,273
Mail	9	9	0	23	16	7	32
2009 Total Interviews	1,420	1,292	128	3,490	2,018	1,472	4,910
Phone-outbound	1,002	874	128	1,387	1,371	16	2,389
Phone-inbound	49	49	0	290	54	236	339
Web/Internet	325	325	0	1,598	533	1,065	1,923
Mail	44	44	0	215	60	155	259
2010 Total Interviews	1,253	1,126	127	3,225	1,789	1,436	4,478
Phone-outbound	761	640	121	1,005	1,005	0	1,766
Phone-inbound	35	29	6	198	56	142	233
Web/Internet	371	371	0	1,619	582	1,037	1,990
Mail	86	86	0	403	146	257	489
2011 Total Interviews	1,087	978	109	3,009	1,628	1,381	4,097
Phone-outbound	656	549	107	885	885	0	1,541
Phone-inbound	38	38	0	228	79	149	266
Web/Internet	306	304	2	1,395	468	927	1,701
Mail	87	87	0	502	196	306	589

and mail modes is that, in the case of the CATI interviews, a trained interviewer guided the respondent through the process, whereas the web and mail surveys were self-administered.

(However, as described below, technical support was available for those completing the web and mail surveys.) Although web and mail respondents were completing the questionnaires without the direct assistance of an interviewer, all correspondence with respondents included contact information for project staff who were available to assist respondents with any problems they had completing the survey. For those completing the survey on-line, there was access to both staff telephone numbers and a link for emailing for technical support.

Languages. The MHIS is administered in three languages--English, Spanish, and Portuguese. All invitation letters and reminders to those in the AB sample and the RDD sample with a known address were delivered in English, Spanish, and Portuguese. Potential respondents with known addresses were invited in all three languages to either call in to arrange a telephone interview or go to the website to complete the survey. From 2008 to 2010, there was a decline in the number of Spanish and Portuguese language interviews. Part of the decline could be an indirect result of the increasing number of people completing the web survey or hard copy questionnaire. We did, however, see the number of Spanish interviews reach 48 in 2011, a number higher than the two previous years of the study. Portuguese interviews continued the downward trend.

Table 4: Number of Completed Interviews by Language of Interview				
Survey Year	Language of Interview			Total Sample
	English	Spanish	Portuguese	
2008	4,817	77	16	4,910
2009	4,855	47	8	4,910
2010	4,436	37	5	4,478
2011	3,953	48	2	4,097

Training Materials and Interviewer Training. CATI interviewers received both written materials on the survey and formal training for conducting this survey. The written materials were provided prior to the beginning of the field period and included:

1. An annotated questionnaire that contained information about the goals of the study as well as detailed explanations of why questions were being asked, the meaning and pronunciation of key terms, potential obstacles to be overcome in getting good answers to questions, and respondent problems that could be anticipated ahead of time as well as strategies for addressing them.
2. A list of frequently asked questions and the appropriate responses to those questions.
3. A script to use when leaving messages on answering machines.
4. Contact information for project personnel.

Interviewer training was conducted both prior to the study pretest (described below) and immediately before the survey was officially launched. Call center supervisors and interviewers were walked through each question in the questionnaire. Interviewers were given instructions to help them maximize response rates and ensure accurate data collection. They were instructed to encourage participation by emphasizing the social importance of the project and to reassure respondents that the information they provided was confidential.

Interviewers were monitored during the first several nights of interviewing and provided feedback where appropriate to improve interviewer technique and clarify survey questions. The interviewer monitoring process was repeated periodically during the field period.

Incentives. In order to encourage participation in the survey, all respondents were notified that through their participation in the study they would be entered into a drawing to win either \$100 or a pair of Red Sox tickets.⁸ In addition, for members of the AB sample without a

⁸ While it is generally accepted that cash incentives are more effective than gifts of equal value (Singer 2002), the Red Sox ticket option was included given the extreme popularity of the team in the state.

listed phone number, an additional incentive of \$20 was offered. Information on the incentives was provided in all advance letters and reminder letters and in the introduction to the survey.

Call Rules for the CATI Interviews. For all RDD sample members and AB sample members with a listed telephone number, the initial telephone interviewing attempt included one initial call plus six callbacks. If an interview was not completed at that point, the telephone number aside for at least two weeks to “rest.” After that rest period, an additional six callbacks were attempted. After another four-week rest period, the sample was dialed back three more times. Overall, households received at least 15 call attempts. To increase the probability of completing an interview, we established a differential call rule that required that call attempts be initiated at different times of day and different days of the week.

Refusal Avoidance and Conversion Strategies. With the increased popularity of telemarketing and the use of telephone answering machines and calling number identification (i.e., caller-ID), the problem of non-response has become acute in household telephone surveys. Similarly, the increasing prevalence of unsolicited advertising in the mail (i.e., junk mail) makes it more difficult to conduct surveys using only invitation letters as we are doing here with the AB sample without a listed telephone number. In addition to the incentives and call rules for the CATI interviews outlined above, we employed several other techniques to maximize the response rate for the survey. In the CATI interviewing, this included providing a clear and early statement that the call was not a sales call. In all three versions of the survey (telephone, web, and mail), the introduction included an explanation of the purpose of the study, the expected amount of time needed to complete the survey, and a discussion of the incentives. A toll-free 1-800 number was provided to all respondents with a known address.

In an effort to maximize the response rate in the interview phase, respondents were given every opportunity to complete the interview at their convenience. For instance, those refusing to continue at the initiation of or during the course of the telephone interview were offered the opportunity to be re-contacted at a more convenient time to complete the interview. They were also offered the opportunity to complete the survey on-line or to call into the 1-800 toll-free telephone number to complete the survey at their convenience. Those completing the interview on the web were able to complete the survey at their own speed and stop and re-start as needed.

A key way to increase responses rates is through the use of refusal conversions. Though all of SSRS's interviewers regularly go through "refusal aversion" training, refusals are still a regular part of survey research. For all of the RDD sample and the AB sample with a listed telephone number, SSRS used a core group of specially-trained and highly-experienced refusal conversion interviewers to call all who initially refused the survey in an attempt to persuade respondents to complete the survey.

Completed Interviews. Table 5 shows the number of completed interview done in households that had only a cell phone, only a landline phone, both a landline and cell phone, and the residual categories for no telephone or telephone status unknown. As expected, the proportion of completes from cell phone-only households has been increasing in each round of data collection. In 2011, we completed surveys with 820 cell phone-only households, 2,865 landline and cell phone households, 393 landline-only households, and 10 non-telephone households.

Table 5: Completed Interviews for the RDD and AB Samples, by Household Telephone Status

	RDD sample			AB sample			Total Sample
	Total	With Known Address	With No Known Address	Total	With Listed Landline Telephone Number	With No Listed Landline Telephone Number	
2008 Total Interviews	1,619	1,479	140	3,291	2,102	1,189	4,910
Cell phone-only	16	16	0	279	23	256	295
Landline phone-only	297	265	32	484	390	94	781
Cell phone and landline phone	1,271	1163	108	2,444	1645	799	3715
No telephone	0	0	0	0	0	0	0
Phone status unknown	35	35	0	84	44	40	119
2009 Total Interviews	1,420	1,292	128	3,490	2,018	1,472	4,910
Cell phone-only	16	16	0	572	62	510	588
Landline phone-only	225	204	21	424	333	91	649
Cell phone and landline phone	1,131	1,030	101	2,361	1,540	821	3,492
No telephone	0	0	0	24	10	14	24
Phone status unknown	48	42	6	109	73	36	157
2010 Total Interviews	1,253	1,126	127	3,225	1,789	1,436	4,478
Cell phone-only	10	9	1	631	80	551	641
Landline phone-only	157	132	25	323	253	70	480
Cell phone and landline phone	1,023	931	92	2,120	1,373	747	3,143
No telephone	2	1	1	20	5	15	22
Phone status unknown	61	53	8	131	78	53	192
2011 Total Interviews	1,087	978	109	3,010	1,628	1,382	4,097
Cell phone-only	11	11	0	809	107	702	820
Landline phone-only	134	116	18	259	196	63	393
Cell phone and landline phone	940	849	91	1,925	1,318	607	2,865
No telephone	2	2	0	17	7	10	19
Phone status unknown*	0	0	0	0	0	0	0

* Phone status unknown in 2011 were imputed

Summary of Changes in the MHIS in Different Years. While the basic structure of the MHIS is consistent across years, we have made some changes over time, primarily in an effort to increase the survey response rate.

Changes between 2008 and 2009. Changes between the 2008 and 2009 included:

1. All letters were mailed on color letterhead to increase the visual appeal of the letter and, thereby, increase the likelihood that potential respondents would read the contents.
2. The first and second advance letters were mailed in larger envelopes (6" x 9") with live stamps to increase the likelihood that the envelopes were opened.
3. The third advance letter was sent in a priority mail envelope, including a copy of the hard copy questionnaire for a random subset of the sample (see below).
4. The call attempt pattern was changed to have a two week rest period after six calls and a four week rest period after twelve calls.
5. The survey field period was extended to four months.
6. There were two attempts to convert refusals instead of one.
7. A progress meter was added to the web version of the survey to keep respondents informed about how much longer the survey would take.
8. Sample was put through four listed databases (rather than one as was done in 2008) to maximize the number of addresses found in the RDD sample and telephone numbers in the AB sample.

As part of the changes in the 2009 MHIS we conducted an experiment to test alternative strategies for sending follow-up letters and the mail version of the questionnaire. Specifically, sample records were randomly assigned to one of four conditions shown in Table 6.

Table 6: Alternate Strategies used in 2009 MHIS			
Condition	First Mailing	Second Mailing	Third Mailing
1	Letter	Letter	Letter w/ Full Instrument
2	Letter	Postcard	Letter w/ Full Instrument
3	Letter	Letter	Postcard
4	Letter	Postcard	Letter

Overall, condition 2 (initial letter, postcard, letter with full instrument) was significantly more successful in securing completed interviews.

Changes between 2009 and 2010. After determining that the addition of a hardcopy questionnaire in the third mailing was beneficial in increasing response rates, we decided to provide the hardcopy questionnaire to all respondents who had not completed the survey by the date of the third mailing. As a result, just over 10% of the 2010 interviews were from people completing the hard copy questionnaire compared with 5% in 2009.

We also added an experiment to test what types of caller ID tags would result in higher rates of response. All sampled households that had a phone numbers associated with them were randomly assigned one of four possible caller ID tags. The tags contained two components: each featured either a local phone number or a 1-800 phone number and either the words “Health Survey” or “Health Study.” After six calls, any households that were still active were switched from one type of phone number to the other, though the text remained constant. This switch was implemented because of the hypothesis that the local number would be the most persuasive and result in obtaining a greater number of completed interviews.

As the table below demonstrates, there was no consistent significant effect of altering the wording of the caller ID tag, but a higher percentage of completed surveys resulted from respondents who saw a caller ID tag with a local number vs. a 1-800 number.

Table 7: Completes by Caller ID Experimental Condition – Sample With Phone Number						
	617 and Survey	617 and Study	1-800 and Survey	1-800 and Study	Total 617	Total 1-800
Completed Interviews	788	829	741	684	1,617	1,425
Percent of Total	49%	51%	52%	48%	53%	47%

Changes between 2010 and 2011.

No changes were made from 2010 to 2011 other than the utilization of a uniform Caller ID rather than the number of experimental conditions that were executed in 2010. However, the field period for conducting interview occurred later in the year and was longer than the prior three rounds of data collection. This is due, in part, to the increase in mail responses in 2011.

IV. Data Processing and Preparation

Two analytical data files were created from the raw unedited survey data: (1) a person-level file that includes all data elements collected for all persons in the household and data on the characteristics of the household and (2) a target-level file that includes all data elements collected for the target person in the household along with data on the characteristics of the target's family and household. Table 2 provides a summary of the variables included in each file. CATI range and logic checks were used to check the data during the data collection process. Additional data checks were implemented as part of the data file development work, checking for consistency across variables and family members, and developing composite measures of family and household characteristics.

Missing values for key demographic variables—age and race/ethnicity, health and disability status, and family income have been replaced through imputation in both files. For the variables for which imputed data were created, the data files include both the original variable (with missing values) and a new variable that includes the imputed values for cases that had missing values. In general, the item nonresponse was quite low; however, item nonresponse for family income was somewhat higher. In each year, roughly 13% of the total sample is missing all data on the income questions, while another 5% provided information on whether family

income was above or below 300% of the federal poverty level but not any additional information. The levels of non-response were similar across the two sample frames (RDD and AB) and, for the most part, across the three survey modes (telephone, web, and mail). The one exception was income, which was more likely to be missing in the mail surveys than in either the telephone or web surveys.

In imputing values for the variables, we rely on one of two methods: a “hot deck” imputation method or a regression-model-based imputation method. In hot deck imputation, the missing value for an individual who failed to respond to a question is replaced by the value reported by a “similar” respondent for that question. A “similar” individual is identified based on observed characteristics that are strong predictors of the value of the variable with nonresponse. In regression-based imputation, the missing value is replaced by the best linear unbiased predicted value from a regression model plus a random error term (to preserve the underlying distribution of the variable).

We do not impute values for missing data for the remaining variables in the file. We have, however, incorporated edits across related variables and across family members to ensure consistent survey responses. While item non-response is relatively low in the survey, it is higher for questions that ask for more detailed information. For example, when asked about the number of employees in their firm, less than 4% of non-elderly adults were unable to answer a question based on whether the number was less than 51 or 51 or more workers, while 11% were unable to answer when more detailed categories were asked about (less than 10, 11 to 50, 51 to 100, 101 to 500, 501 to 1000, or 1000 or more workers). In general, item non-response is higher for questions that seek more detailed information and measures that require combining responses across individual family members.

V. Response Rates

Response rates are one method used to assess the quality of a survey, as they provide a measure of how successfully the survey obtained responses from the sample. The American Association of Public Opinion Research (AAPOR) has established standardized methods for calculating response rates (AAPOR, 2008). This survey uses AAPOR's response rate definition RR3, with an AAPOR-approved alternative method of addressing ineligible households (described below). We report the overall response rates achieved for the RDD and AB samples, and for the combined RDD and AB sample (hereafter referred to as the combined sample). Before presenting those estimates, we describe our methods for calculating the response rates.

Defining the Response Rate: The response rate for this study is defined as the number of households in which an interview was completed divided by the estimated number of eligible households in the sample. The challenge in RDD and AB samples is in determining the number of households in the sample who were eligible for the survey. While eligibility for the survey can be determined for many sample households in both RDD and AB samples, there are parts of both samples for which eligibility cannot be determined directly. For example, in an RDD sample, some telephone numbers are never answered, while in an AB sample with address-correction requested, some addresses that do not respond to the survey may be vacant or second homes.

In estimating the response rate for the MHIS, we define four categories of sample records based on AAPOR response rate calculations. There are two categories of eligible sample records: those that resulted in a completed interview (AAPOR category one) and those that did not (AAPOR category two). The latter includes persons who refused to be interviewed and those

who broke-off the interview part way through, as well as any sample record that was determined to be a household (e.g., an answering machine indicated that it was a household and not a business). Another category, AAPOR category four, includes sample records that are known to be ineligible, such as business numbers, fax machine numbers, non-working numbers, and vacant or second homes. Finally, AAPOR category three includes all sample records for which eligibility is unknown, such as RDD sample records that result in a “no answer” (continuous ringing with no answering machine) or AB sample records for which no response or address correction information is obtained. It is this latter category that is difficult to deal with in constructing the response rate since it is inevitable that the category includes both sample households who are eligible for the survey and those who are not.

The size and composition of the category with unknown eligibility varies across the four survey strata. In general, we expect there to be relatively few ineligible addresses in the AB samples since the USPS updates the DSF listing weekly to maintain its mail routes. Within the RDD sample, we expect more ineligible telephone numbers within the unlisted numbers (e.g., businesses) than the listed numbers. Therefore, we calculate response rates separately for each of the survey strata. To generate response rates for the RDD and AB- samples, we average the response rates from the separate strata within each sample after multiplying the response rate of each stratum by the inverse of their sampling rate. To generate an overall response rate for the full sample we average the overall RDD and AB sample response rates in proportion to their overall released sample size.

To allocate the unknown eligibility group for the RDD samples, we use the “survival method” developed at Westat by Brick, Montaquila and Scheuren (2002) to allocate sample members in AAPOR category three (eligibility is unknown) to eligible and ineligible status.

This method used in a number of RDD surveys, including, for example, the Agency for Healthcare Research and Quality’s Consumer Assessment of Healthcare Providers and Systems, the California Health Interview Survey, and the National Survey of America’s Families.

To allocate the unknown eligibility group for the AB samples, we rely on research conducted by Michael Brick and colleagues at Westat using an in-person follow-up to an AB sample in California. They found that 90% of AB sample addresses that did not respond to the initial survey were residential addresses and, thus, eligible for the survey.⁹ Consequently, we assume 90% of those in APPOR category three for the AB samples are eligible for the survey in calculating the response rates for those strata.

In an effort to improve the MHIS response rates, several new strategies were introduced in 2009. Many of these have been mentioned earlier in this report, including color printing, 6 x 9 envelopes and live stamps on all mailings; the extension of the field to four months; the use of four listed databases to find addresses and phone numbers; and a number of changes in call rules and an increase in refusal conversion attempts. Additionally, shortly after the conclusion of the 2008 MHIS, SSRS conducted an internal experiment as part of a health insurance survey in Colorado that involved manual dialing of telephone numbers rather than the usual practice of automated telephone dialers. While telephone dialers dramatically increase the efficiency by which the sample is dialed, SSRS was concerned that they increase initial refusals because the telephone interviewer has no input in the dialing and in fact does not hear anything (the computer dialing or the phone ringing) until a potential respondent says “hello” on the other end of the

⁹ Personal communication with Michael Brick, November 2008. Because AB sample designs are used less often than RDD sample designs, there is not yet an established standard on how to estimate a response rate for an AB sample. We anticipate that this study, along with other recent studies using a similar design, will generate improved procedures for estimating response rates for AB samples.

line. As well, automated dialers can have slight delays as they assign answered calls to specific interviewers. Therefore, the assumption was that automated dialers put the interviewer in less control and therefore a heightened state of stress, and as well, the slight delay may lead to potential respondents to thinking that the call is a telemarketing call and not a research call. The results of the experiment found a 10% decrease in initial refusals in manual dialing compared to computer dialing. Therefore, beginning with the 2009 MHIS, all telephone numbers were manually dialed.

As mentioned earlier, after determining that the addition of a hardcopy questionnaire in the third mailing was beneficial in increasing response rates, we provided the hardcopy questionnaire to all respondents who had not completed the survey by the date of the third mailing. As a result, the number of mail completes almost doubled in 2010.

Overall, as expected, the response rate was higher for the RDD sample than the AB sample in each year. Not surprisingly, the response rate for the AB sample without a listed landline telephone number, which is the strata that includes the cell phone-only households, is consistently the lowest, at 31.8% in 2011. The 2011 response rate for the combined RDD and AB samples was 37.3%. Additional information on the sample disposition in each year of the MA HIS is provided in Appendix Tables 1 to 3, respectively.

Final response rates are summarized in Table 8. The response rates for the RDD and AB samples in the 2011 MHIS were 42.3% and 35.4%, respectively. As shown in the table, the RDD response rate is lower than in 2010. The ABS is also lower, but only slightly. The RDD rate is closest to the one achieved in 2008, the last time the study was conducted over the summer.

The lack of standardization in reporting response rates makes it difficult to compare response rates across surveys (Brick, Ferraro, Strickler, and Rauch 2003). In calculating response rates here, we have made conservative assumptions about the share of ineligible households in the MHIS and have required that the respondent complete the bulk of the survey to be counted as a completed interview, which will tend to make the response rates we report look low relative to other surveys. Final response rates are summarized in Table 8. The response rate for the study was 37.3%.

Table 8: MHIS Response Rates, by Survey Year¹⁰				
Sample	2008	2009	2010	2011
Combined RDD and AB sample	33.4%	42.2%	41.1%	37.3%
RDD sample	42.0%	49.6%	48.7%	42.3%
RDD sample (with listed address)	49.1%	53.9%	54.3%	48.0%
RDD sample (without listed address)	37.2%	43.3%	39.2%	36.7%
AB sample	29.2%	39.2%	38.1%	35.4%
AB sample (with listed landline)	35.1%	43.3%	40.9%	38.3%
AB sample (without listed landline)	21.4%	32.8%	32.1%	31.8%

While we do not have the information needed to make a full assessment of the differences, we believe that differences in how the response rates are calculated explains at least part of the difference between the response rate estimates reported here for the RDD component of the 2008 through 2011 MHIS and the response rates reported for earlier years of the MHIS (reported to be

¹⁰ The response rate formula in 2011 was revised and now excludes non-deliverable AB sample mail addresses from the denominator. This was done to make the eligibility rules consistent between the RDD and AB sample. That is household eligibility is determined on the first contact attempt. This change results in small increases in the AB and combined sample response rates for 2008 through 2010 then had been previously reported.

about 60% based on the screener questions in that survey and, it appears, about 50% based on completion of the full survey), which relied on RDD surveys (Roman 2007).¹¹

As noted above, in calculating the response rates for the MHIS, we rely on a method developed by Westat to allocate sample members in AAPOR category three (eligibility unknown) to eligible and ineligible status. Further, if, as we believe would be appropriate, the response rates for the earlier years of the MHIS were adjusted downward to reflect the higher response rates associated with the oversamples by region and age in those surveys, the response rates for the earlier years of the MHIS would be lower than those that have been reported.¹² Thus, we believe there is less of a gap, if any, between the RDD response rates for the 2008 to 2011 MHIS and those for earlier years of the MHIS than the reported estimates would suggest. However, we would also note that the much longer field period in the earlier years of the MHIS (e.g., almost seven months in 2007) relative to the 2008-2011 MHIS should yield a higher response rate, all else equal. Expanding the field period provides more opportunities to contact households that have not yet responded to the survey; however, the cost is less timely data and greater survey fielding costs.

While response rates provide an indicator of potential bias in a survey (which can arise when survey nonrespondents are significantly different than respondents), lower response rates are not, in and of themselves, an indicator of survey quality since lower response rates do not necessarily increase nonresponse bias in surveys (Groves 2006; Groves and Peytcheva 2008). This issue has been addressed in a number of studies, including, for example, Keeter and

¹¹ Note that, by definition, an RDD survey will effectively have a response rate of zero for cell phone-only households.

¹² Response rates tend to be higher among households in rural areas and among households with elderly members relative to the general population. Both population groups were oversampled in earlier years of the MHIS.

colleagues (2000), who compared the results of a 5-day survey fielding period (response rate of 36%) to the results from fielding the same survey for 8 weeks (response rate 61%), and found no significant differences between the two surveys in the outcomes of interest. Thus, differences in the response rate of the 2008 through 2011 MHIS and the earlier years of the MHIS, even if they do exist, are not necessarily indicative of differences in the accuracy of the data available from the surveys.

VI. Survey Weights and Variance Estimation

Survey Weights. Survey data were weighted to adjust for differential sampling probabilities, to reduce any biases due to differences between respondents and non-respondents (nonresponse bias), and to address gaps in coverage in the survey frame (coverage bias). Survey weights, when properly applied in surveys can reduce the effect of nonresponse and coverage gaps on the reliability of the survey results (Keeter et al. 2000, 2006; Groves 2006).

We constructed analytical survey weights for the MHIS using standard procedures. The same method is used for each year of the survey. In each year, separate weights are created for all persons and for the target-person in the household. The weights can be used to produce adult- and child-level population estimates as well as estimates of the total population in Massachusetts.

Since the survey used a dual-frame sample, weights were constructed separately for the RDD and AB samples, which were then combined to generate weights for the combined sample. In general, the AB sample relies less on post-stratification adjustments than does the RDD sample, suggesting lower coverage bias associated with the AB sample frame. This is consistent with the expectation that the AB sample frame would provide more complete coverage of Massachusetts residents than the traditional RDD sample frame.

Constructing the Household Base Weights. The first step in the weighting process for each sample was to create a household weight for each completed survey. That household weight was used to construct weights for each person in the household and for the target-person in each household.

We began with the household's base weight--the inverse of the probability of selection of the sample telephone number for the RDD sample and the inverse of the probability of selection of the address for the AB sample. We first adjusted the base weight so that all the households acquired the same probability of selection. In the RDD sample, this adjustment corrected for the increased probability of selecting households that had more than one telephone number (based on information on the existence of multiple telephone numbers collected in the survey) and for the under-sampling of unlisted telephone numbers from the RDD sample frame to compensate for their inclusion in the AB sample. In the AB sample, this adjustment corrected for the over-sampling of addresses for which we were unable to obtain a listed telephone number.¹³

We then applied a non-response adjustment. In the RDD sample, this corrected for the lower response rate from households that had unlisted telephone numbers, while for the AB sample this corrected for the lower response rate from addresses for which we were unable to obtain a listed telephone number. Finally, we examined the distribution of the resulting weights and determined that there was no need to implement trimming rules (similar to 2008, 2009 and 2010). There were only a few weights above 4 or below 0.2, and none well above 4 or well below 0.2.

¹³ This adjustment is slightly different in each round since we can use previous year's results to improve our estimate of the percentage of AB sample households that have listed telephone numbers.

Constructing the Person Weights. To create a person weight for each person in an interviewed household we started with the household weight and then post-stratified so that our weighted sample population totals equaled population control totals based on data for Massachusetts. Specifically, we aligned the sample to current Census population estimates for Massachusetts for the age, race/ethnicity, and gender of the population, rates of home ownership, and residence by region of the State. The demographic information and homeownership data came from the Current Population Survey (CPS), March Supplement. Since the CPS does not provide regional estimates, the percentage of the CPS population falling in the regions that are included in the post-stratification (Boston, Eastern, Western, and Central Massachusetts) are estimated based on geographic data from Claritas. We examined the distribution of the resulting person weights and determined that there was no need to implement trimming rules.

Constructing the Target-Person Weights. The basic target-person weights are the product of the final household weight and the inverse of the probability that the person was selected from among all the persons in the household. As with the person weight, this initial target-person weight was post-stratified to population control totals based on the Census data outlined above. We examined the distribution of the resulting target-person weights and determined that there was no need to implement trimming rules.

Creating Weights for the Combined Sample. The critical issue in constructing the weights for the combined sample is to adjust the weights so that all households have an equal probability of being included in the sample. Since households with landline telephones are included in both the RDD and AB samples, while non-landline-telephone households (i.e., cell phone-only households and non-telephone households) are only included in the AB sample, this

means reducing the weights for landline-telephone households and increasing the weights for non-landline-telephone households.

To make this adjustment, we first estimate the percentage of Massachusetts households and residents who live in non-landline-telephone households based on the information collected in the survey for the AB sample. We then adjust the household weight, person weight and the target-person weight for the combined RDD and AB sample so that the percentage living in households without a landline telephone number in that sample equals the estimate from the AB sample. These new combined-sample weights are then post-stratified to the Census control totals described above.

Variance Estimation and the Average Design Effect. Complex survey designs and post-data collection statistical adjustments affect variance estimates and, as a result, tests of significance and confidence intervals. Variance estimates derived from standard statistical software packages that assume simple random sampling are generally too low, which leads significance levels to be overstated and confidence intervals to be too narrow.

The impact of the survey design on variance estimates is measured by the design effect. The design effect describes the variance of the sample estimate for the survey relative to the variance of an estimate based on a hypothetical random sample of the same size. In situations where statistical software packages assume a simple random sample, the adjusted *standard error* of a statistic should be calculated by multiplying by the design effect. Each variable will have its own design effect. In 2011, the average design effect for estimates for the target person in the household is 1.39 (effective sample size = 2,947).

As with all surveys, results based on this sample may differ from what would have been obtained if we had surveyed the entire Massachusetts population. Based on the effective sample

sizes reported above, the sampling error for estimates for outcomes that occur for about 50% of the sample will be +1.79 percentage points based on the target person sample in 2011. For outcomes that occur for 90% or 10% of the sample, the sampling error based on the target sample is +1.07 percentage points in 2011.

The samples selected for each year of the study are independent and therefore we do expect some variation in design effects and hence the sampling error from year to year. However, the higher design effect in 2008 was in part due to the lower response rate in 2008 and the larger survey weights assigned to some respondents in that year. Average design effects and sampling error are summarized in Table 9.

Table 9: Average Design Effects, Sampling Error, and Effective Sample Size, by Year					
	Average Design Effect	Sampling Error (95% CI, Prob.=.5)	Sampling Error (95% CI, Prob.=.1)	Sample Size	Effective Sample Size
2008	1.52	+1.72	+1.03	4,910	3,227
2009	1.22	+1.54	+0.92	4,910	4,030
2010	1.37	+1.71	+1.02	4,478	3,278
2011	1.39	+1.79	+1.07	4,098	2,947

Variance estimation procedures have been developed for most standard software packages to account for complex survey designs. We provide a replicate stratum (strata) and primary sampling unit (psu) variable on the survey data files that can be used with the appropriate weight variable to obtain corrected standard errors using a Taylor series approximation (or other related linearization method). Users interested in using a linearization method can choose to use SUDAAN, the “SVY” commands in Stata, the “PROC SURVEYMEANS” and “PROC SURVEYREG” commands in SAS, or the “CSELECT” complex samples procedures in the SPSS complex samples module.

VII. Estimates of the Share of Non-Landline Telephone Households

As noted earlier, the goal of the AB sample was to capture information on the households in the state that do not have a landline telephone (including cell phone-only households and non-telephone households), as they are not covered in an RDD sample. We estimate that 19% of households in Massachusetts were non-landline telephone households at the time of the survey in 2011, compared to 14.4% in 2009 and 12.6% in 2008. The number of completed interviews in non-landline telephone households in the MHIS has increased in each round: the 2011 sample captured 820 cell phone only households, and the 2010 sample included 663 non-landline-telephone households, while there were 612 non-landline telephone households in the 2009 sample and 295 in the 2008 sample.

VIII. Estimates of the Uninsurance Rate for Massachusetts

Table 10 shows the uninsurance rate by landline status and sample frame. In 2011 the uninsurance rate among non-landline telephone households in Massachusetts was almost twice as high as that of households with landline telephones (5.2% versus 2.9%). Differences in the uninsurance rates between the non-landline and landline telephone households were statistically significant in 2011 and 2010 but not statistically significant in the prior two years. The differences in the estimates of the uninsurance rate across years within the non-landline and landline telephone household samples are not statistically significant.

The estimates of the uninsurance rate were identical for the AB- and RDD samples in 2011, at 3.5% for both. The uninsurance rate for the combined sample was also 3.5%.

Table 10: Estimates of the Uninsurance Rate by Landline status and Sample Frame

	Household with a Landline Telephone	Households without a Landline Telephone	RDD Sample	AB Sample	Total Sample
2008	2.3%	4.9%	2.9%	2.4%	2.6%
2009	2.7%	2.5%	3.1%	2.8%	2.7%
2010	1.5%	3.6%	1.7%	2.0%	1.9%
2011	2.9%	5.2%	3.5%	3.5%	3.5%

IX. Comparison of the RDD and AB Sample Frames

Address-based samples are increasingly being used as an alternative to traditional RDD samples to provide more complete coverage of populations given the growing numbers of households without landline telephones. The MHIS, by relying on dual sample frames, has taken the approach of supplementing the traditional RDD sample with an AB sample rather than replacing the RDD sample entirely. In comparing the AB and RDD samples, we find that:

- The sample yield (defined as the proportion of the sample that resulted in a completed interview) was better and more efficient in the AB sample relative to the RDD sample. As a result, the cost per completed interview was lower with the AB sample.
- The AB sample yielded a sample of cell phone-only households that is generally consistent with National Health Interview Survey estimates for Massachusetts. (Blumberg et al. 2009).
- The AB sample is less reliant on post-stratification weighting than the RDD sample, indicating better population coverage with the AB sample. The better coverage in the AB sample results in smaller weights, which result in smaller design effects and less sensitivity in estimates of key variables due to weighting as compared to the RDD sample.

References

- American Association for Public Opinion Research. "Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 5th edition." (2008) Lenexa, Kansas: AAPOR.
- Blumberg, S.J., and J.V. Luke. "Wireless Substitution: Early Release of Estimates Based on Data from the National Health Interview Survey, July-December 2010." National Center for Health Statistics. June, 2011.
- Blumberg, S.J., et al. 2009. "Wireless substitution: state-level estimates from the National Health Interview Survey, January 2007-June 2010. " National Center for Health Statistics, April 20, 2011.
- Brick, J.M., et al., "Estimating Residency Rates for Undetermined Telephone Numbers." *Public Opinion Quarterly*, 66 (2002), 18-39.
- Brick, J.M., D. Ferraro, T. Stickler and C. Rauch. "2002 NSAF Response Rates." Report No. 8, NSAF Methodology Reports, 2003. Available at www.urban.org/publications/900692.html.
- Groves, R.M. "Nonresponse Rates and Nonresponse Bias in Household Surveys," *Public Opinion Quarterly* 70, no. 5 (2006): 646-75.
- Groves, R. M. and Emilia Peytcheva. 2008. The Impact of Nonresponse Rates on Nonresponse Bias. *Public Opinion Quarterly* 72: 167-189.
- Keeter, S., et al., "Consequences of Reducing Nonresponse in a Large National Telephone Survey," *Public Opinion Quarterly* 67 (Summer 2000): 125-48.
- Keeter, S., et al., "Gauging the Impact of Growing Nonresponse on Estimates from a National RDD Telephone Survey." *Public Opinion Quarterly* 70, no. 5 (2006): 759-779.
- Roman, A.M. "Survey of Insurance Status 2007, Methodological Report" Report to the Massachusetts Division of Health Care Finance and Policy, October 2007.
- Singer, E. "The Use of Incentives to Reduce Nonresponse in Household Surveys," in *Survey Nonresponse*, ed. Robert M. Groves et al. (New York: Wiley, 2002), Chapter 11, 163-77.

APPENDIX
SUPPLEMENTAL TABLES

Appendix Table 1: Disposition of the 2011 MHIS Sample							
Disposition	RDD sample with Listed Landline Telephone Number	AB sample with Listed Landline Telephone Number	AB sample with No Listed Landline Telephone Number	RDD sample with No Listed Landline Telephone Number	Total AB sample	Total RDD sample	Combined Sample
Eligible, completed survey (AAPOR category 1)							
Completed survey	978	1,628	1,382	109	3,010	1,087	4,097
Eligible, did not complete survey (AAPOR category 2)							
Refusal	497	786	48	111	834	608	1,442
Break off	3	4	30	0	34	3	37
Respondent never available	4	1	1	0	2	4	6
Web suspends/Said will do on web, not complete	30	35	0	2	32	35	67
Physically or mentally unable/incompetent	12	30	2	3	32	15	47
Language problem	12	17	0	5	17	17	34
Unknown eligibility, did not complete survey (AAPOR category 3)							
Telephone always busy	153	291	0	40	291	193	484
No answer/no response	439	779	2,902	547	3,681	986	4,667
Answering Machine	290	358	0	96	358	386	744
Call blocking	3	7	26	0	33	3	36
Uncalled	0	0	0	0	0	0	0
Language barrier, etc. (for callback)	0	0	0	0	0	0	0
Not eligible (AAPOR category 4)							
Fax/data line	49	53	0	235	53	284	337
Non-working number	150	529	0	248	529	398	927
Undeliverable mail	126	172	1,051	0	1,223	126	1,349
Identified as non-residence					0	0	0
Business, government office, other organizations	37	57	2	128	59	165	224
No eligible respondent	82	110	104	11	214	93	307
Total Sample	2,865	4,857	5,548	1,535	10,405	4,400	14,805

Appendix Table 2: Disposition of the 2010 MHIS Sample							
Disposition	RDD sample with Listed Landline Telephone Number	AB sample with Listed Landline Telephone Number	AB sample with No Listed Landline Telephone Number	RDD sample with No Listed Landline Telephone Number	Total AB sample	Total RDD sample	Combined Sample
Eligible, completed survey (AAPOR category 1)							
Completed survey	1,126	1,789	1,436	127	3,225	1,253	4,478
Eligible, did not complete survey (AAPOR category 2)							
Refusal	442	650	47	108	697	550	1,247
Break off	78	134	3	20	137	98	235
Respondent never available	10	10	0	2	10	12	22
Web suspends/Said will do on web, not complete	42	81	21	2	102	44	146
Physically or mentally unable/incompetent	25	28	3	6	31	31	62
Language problem	59	137	0	11	137	70	207
Unknown eligibility, did not complete survey (AAPOR category 3)							
Telephone always busy	2	4	0	28	4	30	34
No answer/no response	654	1,708	3,295	590	5,003	1,244	6,247
Not eligible (AAPOR category 4)							
Fax/data line	96	0	0	329	0	425	425
Non-working number	122	0	0	140	0	262	262
Undeliverable mail	112	185	735	0	915	112	1,027
Identified as non- residence	29	33	12	2	45	31	76
Business, government office, other organizations	54	72	0	169	72	223	295
No eligible respondent	14	26	1	1	27	15	42
Total Sample	2,865	4,857	5,548	1,535	10,405	4,400	14,805

Appendix Table 3: Disposition of the 2009 MHIS Sample							
Disposition	RDD sample with Listed Landline Telephone Number	AB sample with Listed Landline Telephone Number	AB sample with No Listed Landline Telephone Number	RDD sample with No Listed Landline Telephone Number	Total AB sample	Total RDD sample	Combined Sample
Eligible, completed survey (AAPOR category 1)							
Completed survey	1,292	2,018	1,472	128	3,490	1,420	4,910
Eligible, did not complete survey (AAPOR category 2)							
Refusal	430	672	85	85	757	515	1,272
Break off	53	80	2	17	82	70	152
Respondent never available	8	12	0	1	12	9	21
Web suspends/Said will do on web, not complete	99	132	30	13	162	112	274
Physically or mentally unable/incompetent	21	23	4	2	27	23	50
Language problem	101	138	21	15	159	116	275
Unknown eligibility, did not complete survey (AAPOR category 3)							
Telephone always busy	2	11	0	3	11	5	16
No answer/no response	608	1,746	3,189	367	4,935	975	5,910
Not eligible (AAPOR category 4)							
Fax/data line	68	0	0	170	0	238	238
Non-working number	755	0	0	2,027	0	2,782	2,782
Undeliverable mail	66	63	1,083	0	1,146	66	1,212
Identified as non- residence	28	43	61	6	104	34	138
Business, government office, other organizations	73	105	0	305	105	378	483
No eligible respondent	118	170	5	24	175	142	317
Total Sample	3,722	5,213	5,952	3,163	11,165	6,885	18,050

Appendix Table 4: Disposition of the 2008 MHIS Sample

Disposition	RDD-Sample with Listed Landline Telephone Number	AB-Sample with Listed Landline Telephone Number	AB-Sample with No Listed Landline Telephone Number	RDD-Sample with No Listed Landline Telephone Number	Total AB-Sample	Total RDD-Sample	Combined Sample
Eligible, completed survey (AAPOR category 1)							
Completed survey	1,479	2,102	1,189	140	3,291	1,619	4,910
Eligible, did not complete survey (AAPOR category 2)							
Refusal	1,126	1,547	43	158	1,590	1,284	2,874
Break off	86	93	24	15	117	101	218
Respondent never available	5	7	-	-	7	5	12
Web suspends/Said will do on web, not complete	155	233	47	15	280	170	450
Physically or mentally unable/incompetent	32	32	-	2	32	34	66
Language problem	34	57	-	4	57	38	95
Miscellaneous	-	1	-	-	1	-	1
Unknown eligibility, did not complete survey (AAPOR category 3)							
Telephone always busy	8	6	-	10	6	18	24
No answer/no response	202	2,127	4,703	532	6,805	734	7,584
Not eligible (AAPOR category 4)							
Fax/data line	148	107	-	271	107	419	526
Non-working number	1,728	NA	-	2,902	NA	4,630	4,630
Undeliverable mail	45	31	1,306	-	1,337	45	1,382
Identified as non-residence	84	64	53	7	117	91	208
Business, government office, other organizations	154	90	-	483	90	637	727
No eligible respondent	148	203	1	26	204	174	378
Total Sample	5,434	6,593	7,386	4,565	13,979	9,999	23,978